



Virginia Citizen Water Quality Monitoring Program **Methods Manual**

July 2003

Virginia Citizen Water Quality Monitoring Program Methods Manual

Prepared by:

**Virginia Citizen Water Quality Monitoring Program,
A cooperative effort of Alliance for the Chesapeake Bay, Virginia Department of
Conservation and Recreation, Virginia Department of Environmental Quality and Virginia
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Much of the information in this manual has been adapted from the Alliance for the Chesapeake Bay's *Citizen Monitoring Program Manual* and U. S. Environmental Protection Agency (EPA) volunteer monitoring manuals. These include:

Center for Marine Conservation & U. S. EPA. *Volunteer Estuary Monitoring: A Methods Manual, Second Edition*.

U. S. Environmental Protection Agency (USEPA), *Volunteer Lake Monitoring: A Methods Manual*. EPA 440/4-91-002.

U.S. EPA. 1997. *Volunteer Stream Monitoring: A Methods Manual*. EPA 841-B-97-003.

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Why is Volunteer Monitoring Important?

Hundreds of Virginians volunteer their time to monitor the quality of Virginia's waterways. These backyard scientists conduct many types of monitoring that vary in sophistication. Examples include: evaluating macroinvertebrate (mainly insect larvae) populations in streams, testing water samples for dissolved oxygen and pH, collecting water samples to be tested by a lab for bacteria and nutrients, and conducting habitat evaluations and stream walks. These volunteer monitors may not have degrees in science but they do have an interest in the quality of their environment. Spending time in the water gives them an opportunity to learn about water quality while collecting valuable data.

Volunteer monitors play an important role in protecting Virginia's natural resources. Although the Virginia Department of Environmental Quality (DEQ) has a large network of professional monitoring stations, DEQ cannot possibly monitor all the waterways in Virginia. Virginia has approximately 50,000 miles of streams and rivers, 2,500 square miles of estuaries, and 100 significant lakes (public water supply and/or > 100 acres) located in Virginia. Local governments may have their own monitoring programs, but those programs gain tremendously when supplemented with volunteer data. Volunteer data is used in a number of ways: to educate students and the community, to collect baseline information to prioritize monitoring needs and establish background conditions, to contribute to local land use decisions, to indicate unusual conditions, for special studies, and for statewide water quality assessment reports. The use of volunteer data as direct evidence in enforcement actions is not appropriate.

How Can You Become a Volunteer Monitor?

Becoming a volunteer monitor is easy. No special background is needed and any age group can participate. An existing organization working in your local watershed is a good place to start. Local organizations can usually provide the training and equipment needed. To find out if there is an existing program in your local watershed, contact the Virginia Citizen Water Quality Monitoring Program (Appendix 1). If there is not an existing program in your area, you may want to consider starting your own program. Any of the Virginia Citizen Water Quality Monitoring Program partners, Alliance for the Chesapeake Bay (ACB), Virginia Department of Conservation and Recreation (DCR), DEQ, and Virginia Save Our Streams Program of the VA Division of the Izaak Walton League of America (VA SOS) can provide assistance.

Virginia Citizen Water Quality Monitoring Program Contacts

- Alliance for the Chesapeake Bay
<http://www.AllianceChesBay.org>
- VA Department of Conservation & Recreation
<http://www.dcr.state.va.us>
- VA Department of Environmental Quality
<http://www.deq.state.va.us/cmonitor>
- VA Save Our Streams Program of the VA Division of the Izaak Walton League of America
<http://www.vasos.org>

Introduction to Citizen Water Quality Monitoring in Virginia

In 1998, Virginia took a major step toward developing the Virginia Citizen Water Quality Monitoring Program by creating the Citizen Monitoring Coordinator position at DEQ. This new position recognized years of effort made by local volunteer monitoring programs across the state to provide high quality data for resource managers. Since its inception, the program has encouraged citizen involvement in water quality issues and produced high quality monitoring data to meet state and local program needs. The 1999 Virginia General Assembly Session further supported the program by creating the Citizen Water Quality Monitoring Grant Program to provide funding for citizen monitoring activities.

ACB, DCR, DEQ, and VA SOS implement the program as a cooperative effort through a formal Letter of Agreement (LOA) signed on April 9, 2002 (Appendix 2). The LOA outlines the commitment of the signatories to developing a comprehensive volunteer monitoring program and the intended uses of water quality data collected by volunteers.



Letter of Agreement Signing Ceremony on April 9, 2002. Pictured are (left to right): Robert G. Burnley, Director, DEQ; Joseph H. Maroon, Director, DCR; David B. Bancroft, Executive Director, ACB; W. Tayloe Murphy, Jr., Virginia Secretary of Natural Resources; Jay Gilliam, Coordinator, VA SOS (*photo by Dawn Shank*).

The overall goals of the Virginia Citizen Water Quality Monitoring Program include:

- Supporting citizen monitoring efforts statewide: ACB, DCR, DEQ, and VA SOS provide a number of services to citizen monitoring groups, including coordination with DEQ monitoring efforts, technical assistance, assistance in locating funding, and training workshops.
- Promoting appropriate quality assurance and quality control: ACB, DCR, DEQ and VA SOS encourage use of appropriate protocols.
- Promoting the use of citizen water quality data in Virginia: Citizen monitoring data is promoted as described in the LOA and is actively sought for inclusion in the Water Quality Assessment Report prepared by DEQ under section 305(b) of the federal Clean Water Act for the U.S. Environmental Protection Agency (EPA) and the Virginia Water Quality Monitoring, Information and Restoration Act. This report assesses water quality data based on the ability of citizens to safely enjoy the designated uses of the

Commonwealth's waters as described in Virginia's water quality standards. Water quality data from a variety of sources are used for the assessments, including data collected by DEQ, other federal, state and local agencies, and volunteer monitoring organizations using DEQ-approved methods. For more information see <http://www.deq.state.va.us/water/305b.html>

- Promoting partnership and collaboration among citizen water quality monitoring efforts.

In 2002, the Virginia General Assembly passed legislation that established the Virginia Citizen Water Quality Monitoring Program in the *Code of Virginia* (Appendix 3). To implement this legislation, the program was modified. Given the substantial costs of laboratory analysis, citizen monitoring organizations that receive state funds to support these analytical costs must meet additional requirements to ensure that the data collected will be useful to DEQ. These programs are required to: (1) conduct the sample analysis at a laboratory with DEQ-approved standard operating procedures and quality assurance/quality control procedures; (2) not collect water samples during spill events or in areas where the data are not useful for water quality assessments, such as in mixing zones near discharge pipes and locations intensively monitored by DEQ; (3) collect water samples that are representative of the stream (usually collected mid-channel just below the water surface) in safe locations on public property or where landowner permission was obtained; (4) submit data electronically to DEQ in the format provided in Appendix 4, and (5) sign a Memorandum of Agreement (MOA) with DEQ. Appendix 5 is a boilerplate MOA between DEQ and a citizen monitoring organization. This boilerplate MOA provides the framework for a cooperative effort and will be customized as appropriate.

The Virginia Citizen Water Quality Monitoring Program supports Citizens for Water Quality (CWQ). CWQ is a statewide consortium of citizen groups, agency representatives, businesses, and individuals interested in preserving and enhancing water resources in Virginia. CWQ conducts an annual citizen monitoring summit and serves as an information exchange for individuals and organizations involved with volunteer water quality monitoring. CWQ hosts a list-serve (see Appendix 6 for information about this list-serve). The DEQ Citizen Monitoring Coordinator distributes meeting announcements and other information of interest to individuals and organizations on the CWQ mailing list.

Cooperative partnerships have enhanced relationships between state agencies and citizen monitoring organizations, which have improved the quality and quantity of citizen water quality data collected in Virginia. This foundation is expected to grow in the future.

Purpose of the Manual

Volunteer monitors are faced with a wide range of options. If you join an established program in your area, many decisions have already been made for you. If you are starting your own program, you will have many decisions to make. Since no program can measure everything all the time, you must make choices based upon what you are trying to learn about your watershed and your resources. This manual will help you make those choices when designing your program.

This manual provides guidance on the advantages and limitations of the more commonly used methods (protocols) for measuring water quality by volunteer monitoring programs and does not attempt to include every protocol for each parameter. Most of the methods listed are currently in use by citizen monitoring organizations throughout Virginia. The intent of this manual is not to limit the protocols used by organizations in Virginia, but to make the selection of protocols easier for newcomers to volunteer monitoring or for those expanding their volunteer monitoring programs.

In addition to this manual, there are many other resources on water quality monitoring (Appendix 7). This manual is specific to Virginia and is intended for use with other resources. Assistance in planning your program is available through the Virginia Citizen Water Quality Monitoring Program. If you are interested in DEQ using your data, you are encouraged to seek assistance from the DEQ Citizen Monitoring Coordinator. DEQ is most interested in data about conditions for which Virginia has water quality standards. Water quality standards describe water quality requirements necessary to meet and maintain uses such as swimming and other water-based recreation, public water supply, fish consumption, and the growth of aquatic life. To learn more about how water quality data is assessed for the Water Quality Assessment Report, please see the most current version of the Water Quality Assessment Guidance Manual (<http://www.deq.state.va.us/watguidance/wqam.html>).

For More Information on Virginia's Water Quality Standards

- Virginia's Water Quality Standards
<http://www.deq.state.va.us/wqs/>

Organization of the Manual

This manual contains sections with chapters grouped by subject area. Section 1 contains Chapters 1-3 that describes planning your program before you begin monitoring and provides basic guidelines for every volunteer monitoring program. Section 2 contains chapters related to individual chemical monitoring parameters. Section 3 addresses specific biological measurements that volunteer monitoring programs may want to measure. Section 4 contains chapters related to physical measurements. The appendices contain additional useful information.

Each chapter devoted to a specific parameter (Chapters 4-15) contains a table describing methods for sampling that parameter (equipment suppliers for equipment can be found in Appendix 8). These tables do not include all available methods, but are meant to serve as references to methods used in Virginia. The tables list organizations using these methods (the contact information for these organizations can be found in Appendix 1) along with the monitoring level for each method. The level is based upon the appropriate uses for data collected using a particular method and the required quality assurance/quality control measures that are undertaken by the monitoring organization (Appendix 9 describes these monitoring levels). As more information becomes available on the methods, these levels are subject to change.